Smart Flood Warning System

Abstract

Floods, a global scourge, afflict millions yearly. In Cebu, Philippines, where heavy rainfall, poor drainage, and urbanization compound the issue, a resilient flood monitoring system is essential. We design and implement an IoT-based flood monitoring system incorporating an ultrasonic sensor, a camera module, a speaker module, a GPS module, a NodeMCU ESP8266, and a solar panel. The ultrasonic sensor measures water surface distance, while the camera module captures flood scenes and identifies objects or individuals using image processing techniques. Simultaneously, the speaker module broadcasts audio alerts generated via text-to-speech technology. The GPS module tracks the device's location, employing geofencing for context-based alerts. Data processing and upload to ThingSpeak IoT cloud occur through the NodeMCU ESP8266. A solar panel ensures system sustainability via optimized energy consumption. Email notifications activate when water levels reach critical thresholds.

This cost-effective, scalable system delivers timely flood data, empowering users to safeguard lives and property. It contributes to smart city development and disaster management, utilizing advanced technologies including machine learning and artificial intelligence. Despite its promise, addressing technical complexities, data security, energy efficiency, and community engagement is crucial.

In conclusion, the Smart Flood Warning System enhances flood monitoring and response in Cebu and beyond. Ongoing research will optimize performance and usability while ensuring data security and community participation.